

Appln No. 10/539,397
Amdt date October 29, 2009
Reply to Office action of April 29, 2009

REMARKS/ARGUMENTS

In the April 29, 2009 Office action, the Examiner made final the previous restriction requirement. In response, Applicant accepts the withdrawal of non-elected claims 23-46 reserving the right to pursue the withdrawn claims in one or more divisional applications.

Rejection Under 35 U.S.C. § 102(b) Based on Kanazawa et al.

The Examiner rejected Claims 1, 3-4, 10-14, 17, 19, and 21 as being anticipated by Kanazawa et al. (J. Polym. Sci., Part A, vol. 31, 1993, 3031-3038). Applicant submits that Claim 1 is not anticipated by Kanazawa et al. for the reasons set out below.

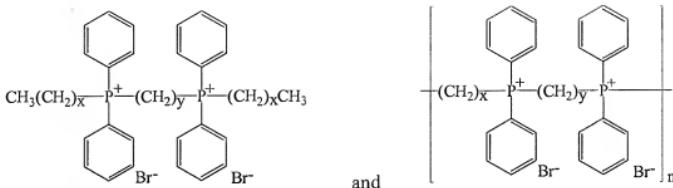
The standard for an anticipation rejection under 35 U.S.C. §102 has been well established by the Court of Appeals for the Federal Circuit, and is summarized in M.P.E.P. § 2131. “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). … “The identical invention must be shown in as complete detail as is contained in the … claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not an *ipsissimis verbis* test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990). …

Applicant respectfully submits that Kanazawa et al. does not disclose each and every element as set forth in Claim 1 for at least the reason that the polymeric phosphonium salts of Kanazawa et al. contain two phenyl groups on each phosphonium ion. For example, the structures of Figure 1 found on page 3032 of Kanazawa et al. (reproduced below) contain two phenyl groups on the phosphonium ion of the structure.

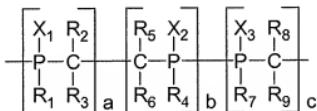
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Claim 1 is directed to a polymer comprising one or more of a unit having the formula:

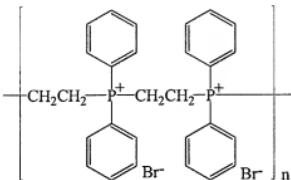


Claim 1 recites that “each of X_1 , X_2 , and X_3 are the same or different and is an electron pair, a chalcogen, halogen, a Lewis acid, a metal ion, an ylide, an alkoxy, an azide, an alkyl or an alkyl halide” and that “each of R_1 , R_4 , and R_7 are the same or different and is a member selected from the group consisting of: a secondary alkyl; a tertiary alkyl; an alkyl substituted with cycloalkyl, trialkylsilyl, aryl or heteroaryl; an aryl; a heteroaryl; a cycloalkyl; and a heterocycloalkyl, wherein the member comprises at least 3 carbon atoms, heteroatoms if present are selected from -O-, -S-, and -N-, said alkyl, cycloalkyl, heterocycloalkyl, aryl and heteroaryl moieties are optionally substituted with halogen and alkoxy, and said aryl, heteroaryl, cycloalkyl and heterocycloalkyl moieties are optionally substituted with alkyl and alkyl halide”.

Polymeric phosphonium salts containing two phenyl groups on each phosphonium ion, as disclosed in Kanazawa et al., do not teach the polymers of Claim 1 based on the definitions of X_1 , X_2 , X_3 , R_1 , R_4 and R_7 in this claim.

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In the Office Action, the Examiner has alleged “[t]hat the instant polymer is met when x and y is 2 (see structure on page 3032)”. Applicant respectfully disagrees and submits that the polymers of Claim 1 are not disclosed by Kanazawa et al. As discussed above, the structure of Kanazawa et al. when x and y is 2 (reproduced below) is different from the polymers of Claim 1 because the phosphonium ion of the Kanazawa et al. structure is bonded to two phenyl groups, which is not covered by Claim 1.



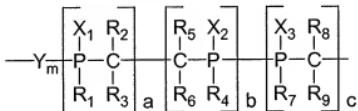
Applicant also submits that the structure of Kanazawa et al. when x and y is 2 is different from the polymers of Claim 1 because the number of carbon atoms to the number of phosphorus atoms of the polymer backbone of the repeating unit of Kanazawa et al. is different from the number of carbon atoms to the number of phosphorus atoms of the polymer backbone of the repeating unit of the polymers of Claim 1. Furthermore, Applicant submits that Kanazawa et al. does not disclose a structure with a combination of x and y values which teaches the polymers of Claim 1.

Accordingly, Applicant submits that Claim 1 is not anticipated by Kanazawa et al. and requests withdrawal of the rejection of Claim 1 based on Kanazawa et al.

Claims 3-4, 11-14, 17, 19, and 21 all depend directly or indirectly on Claim 1. As explained above, Claim 1 is not anticipated by Kanazawa et al. Accordingly, withdrawal of the rejection of Claims 3-4, 11-14, 17, 19, and 21 based on Kanazawa et al. is respectfully requested.

Applicant notes that Claim 5 was not rejected by the Examiner as anticipated by Kanazawa et al. Applicant submits that Claim 10, which depends directly on Claim 5, is not anticipated by Kanazawa et al. Applicant further submits that Kanazawa et al. does not disclose each and every element as set forth in Claim 5 for at least the reason that the polymeric phosphonium salts of Kanazawa et al. contain two phenyl groups on each phosphonium ion.

Claim 5 is directed to a polymer comprising one or more of a unit having the formula:



Claim 5 recites that “each of X₁, X₂, and X₃ are the same or different and is an electron pair, a chalcogen, halogen, a Lewis acid, a metal ion, an ylide, an alkoxy, an azide, an alkyl, or an alkyl halide” and that “each of R₁, R₄, and R₇ are the same or different and is a member selected from the group consisting of: a secondary alkyl, a tertiary alkyl; an alkyl substituted with cycloalkyl, trialkylsilyl, aryl or heteroaryl; an aryl; a heteroaryl; a cycloalkyl; and a heterocycloalkyl, wherein the member comprises at least 3 carbon atoms, heteroatoms if present are selected from -O-, -S-, and -N-, said alkyl, cycloalkyl, heterocycloalkyl, aryl and heteroaryl moieties are optionally substituted with halogen or alkoxy, and said aryl, heteroaryl, cycloalkyl and heterocycloalkyl moieties are optionally substituted with alkyl and alkyl halide”.

Polymeric phosphonium salts containing two phenyl groups on each phosphonium ion, as disclosed in Kanazawa et al., do not teach the polymers of Claim 5 based on the definitions of X₁, X₂, X₃, R₁, R₄ and R₇ in this claim.

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Since Claim 5 is not anticipated by Kanazawa et al., Claim 10, which depends directly on Claim 5, is also not anticipated by Kanazawa et al. Accordingly, withdrawal of the rejection of Claim 10 based on Kanazawa et al. is respectfully requested.

Rejection Under 35 U.S.C. § 102(b) Based on GB 906,408

The Examiner rejected Claims 1-2, 4, and 11-22 as being anticipated by GB 906,408. Applicant submits that Claim 1 is not anticipated by GB 906,408 for the reasons set out below.

In the Office Action, the Examiner has alleged as follows:

“GB-408 discloses phosphorus-containing polymer as defined in col. 1, line 15, wherein R is a monofunctional aromatic hydrocarbon radical, X is a difunctional hydrocarbon group, and Y is an oxygen, sulfur atom or is absent (i.e. an electron pair), thus, embracing the instant polymer as defined in the present claims.”

Applicant respectfully disagrees and submits that GB 906,408 does not teach each and every element as set forth in Claim 1 because GB 906,408 does not provide an enabling disclosure of the polymers of Claim 1. Applicant submits that the polymerization process disclosed in GB 906,408 would not have placed the person of ordinary skill in the art in possession of the polymers of Claim 1.

GB 906,408 discloses a condensation polymerization process involving the reaction of a difunctional organo-metallic compound of the formula M-X-M with a phosphorus compound of the formula:



where M is MgCl, MgBr, MgI, Li, Na or K; Z is chlorine, bromine or iodine; R is a monofunctional aromatic hydrocarbon radical; X is a difunctional hydrocarbon group which can be aliphatic, aromatic, or substituted groups of these types; and Y is an oxygen atom, a sulphur atom or is absent (i.e. the phosphorus is trivalent). GB 906,408 discloses on page 2 (lines 4-6) that the condensation may be carried out in a suitable solvent at temperatures in the range of -40° C to 150° C. GB 906,408 fails to disclose the preparation of any phosphorus containing condensation polymers having a single carbon atom in the polymer backbone of the repeating unit. GB 906,408 does not disclose condensation polymerization involving a difunctional C₁organo-metallic compound, and only teaches the use of difunctional organo-metallic compounds, such as LiC₆H₄Li, to prepare phosphorus containing condensation polymers having multiple carbon atoms in the polymer backbone of the repeating unit.

Applicant further submits that the condensation polymerization process disclosed in GB 906,408 would not produce the polymers of Claim 1 using difunctional C₁organo-metallic compounds needed for the condensation polymerization under the conditions disclosed in GB 906,408. Generation of difunctional C₁organo-metallic compounds requires very low temperatures below -100 °C (see for example, Marek, I. et al., *Chem Rev.* 1996, 96,3241-3267; pages 3241-3242; reference enclosed herewith) in contrast to the temperature range of -40° C to 150° C disclosed in GB 906,408. The difunctional organo-metallic compounds disclosed in GB 906,408, such as phenylene 1:4 or 1:3 dimetallic (page 3, line 15) and LiC₆H₄Li (Example 1), are much more easily generated than difunctional C₁organo-metallic compounds, such as single carbon dilithiates and di-Grignard reagents. Even if difunctional C₁organo-metallic compounds could be produced, it would be difficult to produce these compounds in high purity and yield due

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to many different possible side reactions. It would be difficult to generate difunctional C₁organo-metallic compounds in sufficient purity and yield for the condensation polymerization process of GB 906,408, which requires high purity and accurate stoichiometry as a step growth polymerization reaction. In addition, difunctional C₁organo-metallic compounds, such as single carbon dilithiates and di-Grignard reagents, are generally not stable at temperatures greater than -100 °C, and would therefore not be stable under the condensation polymerization conditions of GB 906,408 (i.e. conducted at a temperature range of -40° C to 150° C).

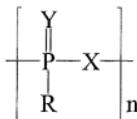
Furthermore, Applicant submits that GB 906,408 does not disclose each and every element as set forth in Claim 1 for at least the reason that the polymers of Claim 1 cannot be “at once envisaged” from any disclosure of GB 906,408.

As summarized in M.P.E.P. § 2131 “[w]hen the compound is not specifically named, but instead it is necessary to select portions of teachings within a reference and combine them, e.g., select various substituents from a list of alternatives given for placement at specific sites on a generic chemical formula to arrive at a specific composition, anticipation can only be found if the classes of substituents are sufficiently limited or well delineated. *Ex parte A*, 17 USPQ2d 1716 (Bd. Pat. App. & Inter. 1990). If one of ordinary skill in the art is able to “at once envisage” the specific compound within the generic chemical formula, the compound is anticipated. One of ordinary skill in the art must be able to draw the structural formula or write the name of each of the compounds included in the generic formula before any of the compounds can be “at once envisaged.” One may look to the preferred embodiments to determine which compounds can be anticipated. *In re Petering*, 301 F.2d 676, 133 USPQ 275 (CCPA 1962).”

For example, GB 906,408 recites as follows on page 1, lines 13-22:

A linear polymer in accordance with the present invention
has the formula

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where R is a monofunctional aromatic hydrocarbon radical, X is a difunctional hydrocarbon group which can be aliphatic, aromatic, or substituted groups of these types; Y is an oxygen atom, a sulphur atom or is absent (i.e. the phosphorus is trivalent); and n is an integer of from 3 to 10 or higher.

Applicant submits that GB 906,408 does not disclose classes of substituents in a sufficiently limited or well delineated manner as exemplified by X which is defined as “a difunctional hydrocarbon group which can be aliphatic, aromatic, or substituted groups of these types”. Applicant submits that one of ordinary skill in the art would not “be able to draw the structural formula or write the name of each of the compounds included in the generic formula” based on the definition of X which covers a vast number of alternatives which are not clearly defined. Accordingly, one of ordinary skill in the art would not be able to “at once envisage” the polymers of Claim 1 within the generic chemical formula of GB 906,408. Furthermore, Applicant submits that none of the examples of GB 906,408 involve a phosphorus containing condensation polymer having only one carbon atom in the polymer backbone of the repeating unit, as exemplified by Example 1 of GB 906,408 wherein the polymer backbone of the repeating unit contains a C₆H₄ group.

Applicant submits that Claim 1 is not anticipated by GB 906,408. Accordingly, withdrawal of the rejection of Claim 1 based on GB 906,408 is respectfully requested.

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Claims 2, 4, and 11-22 all depend directly or indirectly on Claim 1. As explained above, Claim 1 is not anticipated by GB 906,408. Accordingly, withdrawal of the rejection of Claims 2, 4, and 11-22 based on GB 906,408 is respectfully requested.

Rejection Under 35 U.S.C. § 102(b) Based on GB 1,021,016

The Examiner rejected Claims 1, 3-13, 15-19, and 21 as being anticipated by GB 1,021,016. Applicant submits that Claim 1 and Claim 5 are not anticipated by GB 1,021,016 for the reasons set out below.

In the Office Action, the Examiner has alleged that:

“GB-016 discloses a phosphorus-containing copolymer derived from copolymerization of a phosphine compound $PX_1X_2X_3$ with an ethylenically unsaturated monomers such as (meth)acrylic esters, styrene, and isoprene (page 1, lines 54-90). Thus, meeting the instant polymer and copolymer as expressed in the present claims.”

Applicant respectfully disagrees and submits that GB 1,021,016 does not disclose the polymers of Claim 1 for at least the reason that the groups X_1 , X_2 and X_3 of the phosphorus atom of the phosphorus-containing polymers of GB 1,021,016 are different from the groups X_1 and R_1 ; X_2 and R_4 ; and X_3 and R_7 of the polymers of Claim 1.

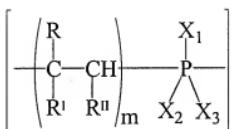
For example, Applicant notes that GB 1,021,016 recites as follows on page 1, lines 32-44:

According to the present invention, therefore, we provide a copolymer of a phosphine compound of the formula $PX_1X_2X_3$ where X_1 , X_2 and X_3 , which may be the same or different, are

halogen atoms or alkyl, aryl, aralkyl, alkenyl, phenoxy, alkoxy, cyano, acyl, cyanate, isocyanate or thiocyanate radicals, provided that all three of X_1 , X_2 and X_3 are not phenoxy or alkoxy radicals and that two of X_1 , X_2 and X_3 are not phenoxy or alkoxy radicals when the third is halogen atom, and a polymerisable compound containing a terminal double bond.

GB 1,021,016 also recites as follows on page 1, lines 81-page 2, line 7:

The copolymers comprise structural units of the formula: -



where m is an integer equal to or larger than 1, R , R^1 and R^{II} , which may be the same or different, represent the substituents present in the olefinically unsaturated comonomer and are substituted or unsubstituted alkyl, alkenyl, aralkyl, aryl or heterocyclic groups, and X_1 , X_2 and X_3 have the above-stated meaning.

Applicant submits that the copolymers of GB 1,021,016 are different from the polymers of Claim 1 because of the presence of the three groups X_1 , X_2 and X_3 around the phosphorus atom in the above formula $\text{P} \text{X}_1 \text{X}_2 \text{X}_3$ and in the above copolymer structure. The presence of X_1 , X_2 and X_3 in the phosphorus-containing polymers of GB 1,021,016 and their respective

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definitions do not teach the polymers of Claim 1 based on the definitions of X₁ and R₁; X₂ and R₄; and X₃ and R₇ in this claim.

Applicant also submits that the number of carbon atoms to the number of phosphorus atoms of the polymer backbone of the repeating unit of the phosphorus-containing polymers of GB 1,021,016 is different from the number of carbon atoms to the number of phosphorus atoms of the polymer backbone of the repeating unit of the polymers of Claim 1.

Applicant submits that Claim 1 is not anticipated by GB 1,021,016. Accordingly, withdrawal of the rejection of Claim 1 based on GB 1,021,016 is respectfully requested.

Claims 3, 4, 11-13, 15-19, and 21 all depend directly or indirectly on Claim 1. As explained above, Claim 1 is not anticipated by GB 1,021,016. Accordingly, withdrawal of the rejection of Claims 3, 4, 11-13, 15-19, and 21 based on GB 1,021,016 is respectfully requested.

Applicant submits that GB 1,021,016 does not disclose the polymers of Claim 5 for at least the reason that the groups X₁, X₂ and X₃ of the phosphorus atom of the phosphorus-containing polymers of GB 1,021,016 are different from the groups X₁ and R₁; X₂ and R₄; and X₃ and R₇ of the polymers of Claim 5. As explained above for Claim 1, the presence of the three groups X₁, X₂ and X₃ around the phosphorus atom in the formula PX₁,X₂,X₃ and in the copolymer structure disclosed in GB 1,021,016 and their respective definitions do not teach the polymers of Claim 5 based on the definitions of X₁ and R₁; X₂ and R₄; and X₃ and R₇ in this claim.

Applicant submits that Claim 5 is not anticipated by GB 1,021,016. Accordingly, withdrawal of the rejection of Claim 5 based on GB 1,021,016 is respectfully requested.

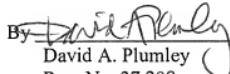
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Claims 6-10 all depend directly on Claim 5. As explained above, Claim 5 is not anticipated by GB 1,021,016. Accordingly, withdrawal of the rejection of Claims 6-10 based on GB 1,021,016 is respectfully requested.

Conclusion

Based on the above comments, Applicant requests reconsideration, and allowance of all claims. However, if the Examiner has any remaining questions that can best be addressed by telephone, she is asked to contact Applicant's counsel at the number below.

Respectfully submitted,
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